INSTALLATION MANUAL FOR ILB HELIOS PHOTOVOLTAIC MODULES

ILB Helios AG Switzerland / ILB Helios Spain S.A. / ILB Helios Italia S.r.l.| NA-Series | Version 22-038-2011

© Copyright 2009 ILB Helios AG | Specifications are subject to change without prior note. ILB Helios is not responsible for spelling mistakes or missing parts.

ILB Helios AG / ILB International Logistikbetriebe AG
Bruggerstrasse 71 | CH-5401 Baden | Phone: +41 56 205 30 60 | Fax: +41 56 210 02 28

Content

1. GENERAL INFORMATION 3
2. GENERAL HANDLING AND INSTALLATION 3
3. MODULE WIRING AND ELECTRICAL CONNECTIONS 5
   a. Series connection 6
   b. Parallel connection 7
   c. By-Pass Diode 7
   d. Grounding 9
4. MECHANICAL INSTALLATION 10
5. MAINTENANCE 13
6. Electrical Ratings of the Modules 13
7. Contacts 13

ILB Helios AG Switzerland / ILB Helios Spain S.A. / ILB Helios Italia S.r.l. | NA-Series | Version 22-038-2011

© Copyright 2009 ILB Helios AG | Specifications are subject to change without prior note. ILB Helios is not responsible for spelling mistakes or missing parts.

1. GENERAL INFORMATION

This guide provides basic information regarding the installation and handling precautions of **ILB HELIOS** photovoltaic modules.

Please, read this guide entirely before the installation, handling, operation or maintenance of a PV module. All instructions should be read and understood prior to performing the mentioned works. **ILB HELIOS** is not responsible for damages caused by not following the instructions in the manual. Please consult also the manual from the other companies/supplier, who are involved in the whole installation sit.

The installation manual is part of the documents bounded to the solar system and has to be stored together with the other documents related to this installation over the whole lifecycle of the product. Please, overhand this document to the operating company.

Pleas call **ILB HELIOS** if you have any questions related to the module, installation site, tilt angel or the installation it selves.

ILB HELIOS photovoltaic modules are qualified for Application Class A: Hazardous voltage (IEC 61730: higher than 50V DC; EN 61730: higher than 120V DC), hazardous power applications (higher than 240W) where general contact access is anticipated. **ILB HELIOS** photovoltaic modules qualified for safety through EN IEC 61730-1 and -2 within this application class are considered to meet the requirements for Safety Class II.

Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly, the values of I_{SC} and V_{OC} marked on this module should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor current ratings, fuse sizes, and size of controls connected to the PV output.

2. GENERAL HANDLING AND INSTALLATION

- PV modules generate electricity when exposed to a light source. Lethal shock and burn hazard can result from the contact of module live parts or wiring. These hazards are increased with the multiple connections of PV modules to increase the system voltage or current. The front surface of the module must be covered completely with an opaque material during installation, maintenance or other ways of handling to avoid these hazards. Do not connect or disconnect the cable coupler under load; this can cause an electrical arc. Shut down the string before start working on the modules.

- PV modules installation involves electricity and requires specialized skills and knowledge. The installation should only be performed by qualified personnel familiarized with the appropriate safety procedures. The national and international regulations for installing electrical components and safety regulations have to be followed. Special safety regulations must be obey for installations on the rooftop, to protect the installation team and people who are passing by.

- Do not touch live parts or terminal connections with bare hands. Use insulated tools and the appropriate safety equipment and procedures that are approved for working on electrical installations.

- Do not open the junction box.

ILB Helios AG Switzerland / ILB Helios Spain S.A. / ILB Helios Italia S.r.l. | NA-Series | Version 22-038-2011

© Copyright 2009 ILB Helios AG | Specifications are subject to change without prior note. ILB Helios is not responsible for spelling mistakes or missing parts.

- Follow the national and international regulations for lightning protection.
- Work under dry conditions only.
- Do not concentrate light artificially on surface of the PV module to increase its electrical output.
- Do not bend, disassemble the module, or remove any attached components nor step on the PV modules.
- Do not drag the PV modules during handling.
- Do not damage the back sheet of the module during handling.
- Do not attach anything to the back surface.
- Bear in mind the maximum weight load of the module (q.v. module data sheet).
- **ILB HELIOS** is not responsible for any problems related to an installation which was not done by **ILB HELIOS** it selves and ILB Helios will not take over the responsibility for such an installation.
- Please read very carful the installation instruction for the installation kit.
- Keep children away from the installation site.
- Warn from danger points of the installation site.
- Unauthorized person are not allowed to enter the installation site.

ILB Helios AG Switzerland / ILB Helios Spain S.A. / ILB Helios Italia S.r.l.| NA-Series | Version 22-038-2011

© Copyright 2009 ILB Helios AG | Specifications are subject to change without prior note. ILB Helios is not responsible for spelling mistakes or missing parts.

3. MODULE WIRING AND ELECTRICAL CONNECTIONS

Each **ILB HELIOS** photovoltaic module has two 4mm^2 flexible solar cables. Each cable has cable coupler with a snap-in locking system.

- For specific technical information about the cable and the cable coupler, please consult the module data sheet.

The module wiring is designed for series interconnection between modules by connecting the positive connector (+) of one module to the negative connector (-) of the adjacent module.

⚠ CAUTION

- Make sure that the array is disconnected during the installation of modules. Do not connect or disconnect the cable coupler under load.
- Keep cable lengths as short as possible to reduce voltage drop.
- Secure the wiring of modules connection to the supporting frame and use fastening techniques to avoid loose wirings. Do not squeeze, pull or bend cables forcibly.
- Avoid running wiring over sharp edges.
- Use only modules of the same type for series or parallel connections.
- For the Maximum series fuse please, consult the module data for detailed information.
- For the module wiring use only cable coupler of the same type.
- Keep the contacts of the cable coupler all the time clean.
- Don't connect dirty cable coupler
- To connect the solar modules with each other in the array, use only cable which has the licensing for this kind of use.
- Do not connect or disconnect the cable coupler under load.
- Bear the polarity in mind while wiring the modules.

ILB Helios AG Switzerland / ILB Helios Spain S.A. / ILB Helios Italia S.r.l.| NA-Series | Version 22-038-2011

© Copyright 2009 ILB Helios AG | Specifications are subject to change without prior note. ILB Helios is not responsible for spelling mistakes or missing parts.

a.Series connection

For applications with high operating voltage, several modules or strings of modules are connected in series, it is recommended to protect each string by an external blocking diode as per Fig. 3. There is a risk of arcing with high DC voltages, so the use of properly insulated wiring and connectors approved for the maximum system open-circuit voltage is recommended.

Module Types	5" Mono 96pcs	5" Mono 72pcs	6" Mono 72pcs	6" Mono 60pcs	6" Poly 72pcs	6" Poly 60pcs	6" Poly 54pcs
Maximum configuration serial/parallel	**20/3**	**27/3**	**27/3**	**32/3**	**26/3**	**32/3**	**37/3**

⚠ The maximum open-circuit voltage of the system must not be higher than the maximum system voltage for the module (1000V). The amount of modules you can interconnect in an array should be selected according the optimum working voltage of the inverter, but must not exceed the maximum system voltage of 1000V.

⚠ All junction boxes in the array must have at least the licensing for IP65 or IP67.

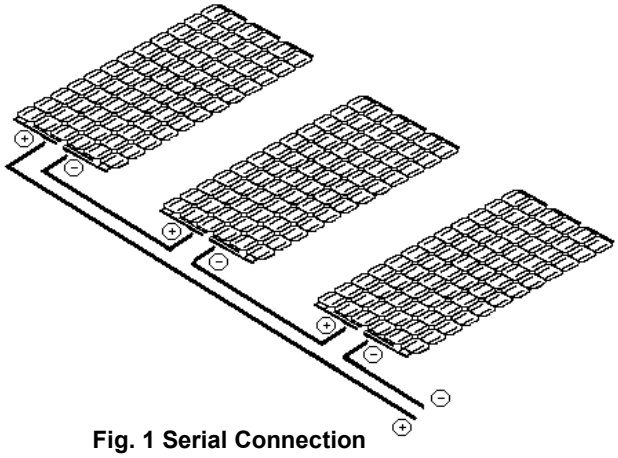

Fig. 1 Serial Connection

ILB Helios AG Switzerland / ILB Helios Spain S.A. / ILB Helios Italia S.r.l.| NA-Series | Version 22-038-2011

© Copyright 2009 ILB Helios AG | Specifications are subject to change without prior note. ILB Helios is not responsible for spelling mistakes or missing parts.

b.Parallel connection

For applications with high current consumption containing low-voltage loads, you can interconnect several modules or strings parallel. Wiring and connectors may become overheated based on the higher current in the system, so correct dimensioned of cross-sectional wires and connectors approved for the systems short-circuit current should be used.

Module Types	5" Mono 96pcs	5" Mono 72pcs	6" Mono 72pcs	6" Mono 60pcs	6" Poly 72pcs	6" Poly 60pcs	6" Poly 54pcs
Maximum configuration serial/parallel	20/3	27/3	27/3	32/3	26/3	32/3	37/3

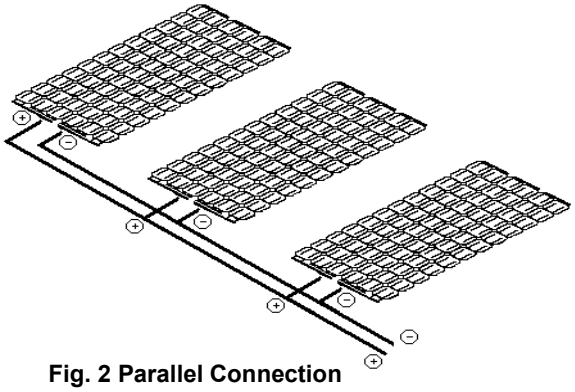

Fig. 2 Parallel Connection

c.By-Pass Diode

By-pass diodes are required to protect each string of the module from the effect of shading. **ILB HELIOS** PV modules are equipped with factory installed by-pass diodes. Please, consult the module data sheet for detailed information about the rated currency and the reverse voltage.

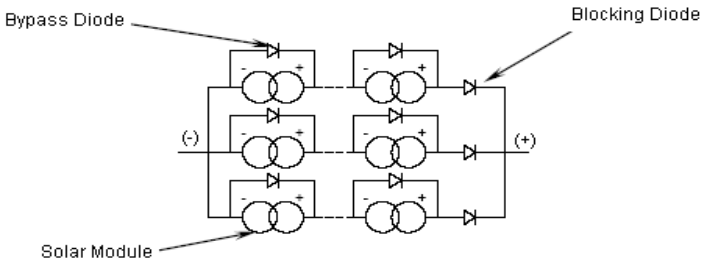

Fig. 3 Blocking and bypass diode installation*

ILB Helios AG Switzerland / ILB Helios Spain S.A. / ILB Helios Italia S.r.l. | NA-Series | Version 22-038-2011

© Copyright 2009 ILB Helios AG | Specifications are subject to change without prior note. ILB Helios is not responsible for spelling mistakes or missing parts.

ILB Helios AG Switzerland / ILB Helios Spain S.A. / ILB Helios Italia S.r.l.| NA-Series | Version 22-038-2011

© Copyright 2009 ILB Helios AG | Specifications are subject to change without prior note. ILB Helios is not responsible for spelling mistakes or missing parts.

ILB Helios AG / ILB International Logistikbetriebe AG
Bruggerstrasse 71 | CH-5401 Baden | Phone: +41 56 205 30 60 | Fax: +41 56 210 02 28

d.Grounding

Module frames and mounting racks must be properly grounded in accordance to local and national electrical codes before wiring the circuit, in order to avoid electrical shock.

For a proper grounding, connect in the first step all module frames in series with a proper grounding conductor. Secondly, connect this conductor to the supporting frame and then to the other supporting members of the installation creating a ring; this ring has then to be grounded at 2 or 3 points.

ILB HELIOS PV module frames is equipped with a ground mark and a 4mm diameter hole. Attach the grounding cable by first stripping about 10 to 15mm of the insulation from the end of the conductor and passing the bare wire in-between the head of a stainless-steel screw (DIN 933 A2 M4x20) and a pressure and dented washer (DIN 6798 A A2 M4) to break the frame anodization. Finally tighten the nut (DIN 934 A2 M4).

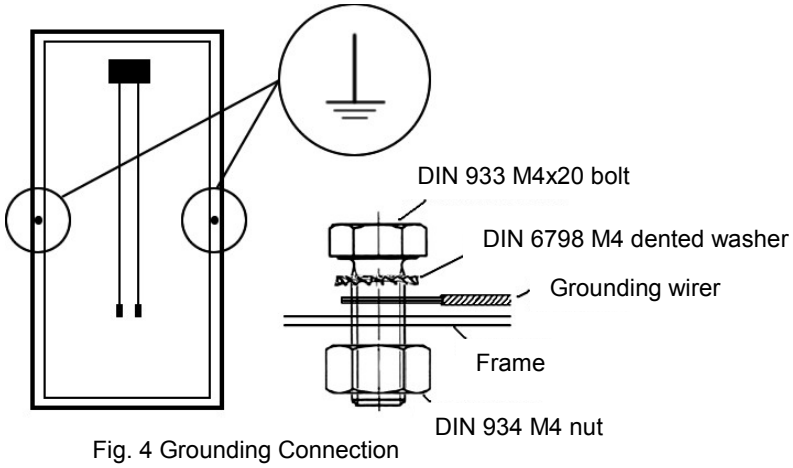

Fig. 4 Grounding Connection

⚠ After you have attached the grounding cable, please check the function of the grounding.

ILB Helios AG Switzerland / ILB Helios Spain S.A. / ILB Helios Italia S.r.l.| NA-Series | Version 22-038-2011

© Copyright 2009 ILB Helios AG | Specifications are subject to change without prior note. ILB Helios is not responsible for spelling mistakes or missing parts.

4. MECHANICAL INSTALLATION

PV modules should be positioned facing south in the northern latitudes and facing north in the southern latitudes. PV modules should not be shaded by other objects. The tilt angle should be at least 10° to assure the self cleaning feature of the Module. Please consult **ILB HELIOS** for detailed information regarding the recommended tilt angle for your site.

PV modules must be securely attached to the mounting surface using support frames/systems or the corresponding installation kits provided by **ILB HELIOS**. Pleas read the installation manual for the installation kit and/or consult your seller for further information.

ILB HELIOS can also provide the planning and the installation of PV modules.

ILB HELIOS PV module mounting shall be performed according to the following instructions:

- The PV module should be supported and anchorage on rigid beams by at least four points, the supports should be located on the rear of the photovoltaic module, by the frame side. Each support should have at least an area of 4 cm^2. The four supports should be located symmetrical to the centre of the module. (See Fig. 5).

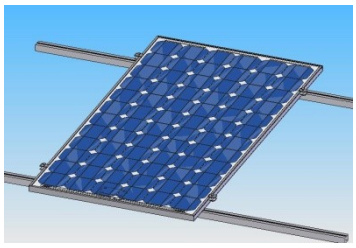

Fig. 5

ILB Helios AG Switzerland / ILB Helios Spain S.A. / ILB Helios Italia S.r.l.| NA-Series | Version 22-038-2011

© Copyright 2009 ILB Helios AG | Specifications are subject to change without prior note. ILB Helios is not responsible for spelling mistakes or missing parts.

- PV module should be fastened to each of the four supports using the appropriate clamping technique as per Fig. 5. The fastening could be done on the front side of the frame with the precaution of not touching the glass and not becoming a source of shadow for the PV cells. The holding bolt should be at least type Metric-M6 8.8. (See Fig. 6).

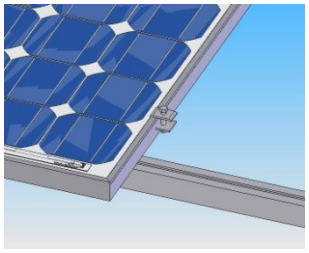

Fig. 6

– PV module could also be attached and mounted using predrilled holes on the frame; those holes will be performed by **ILB HELIOS** upon request. The module will be then attached with bolts, washers and nuts of at least type Metric-M6 (see Fig. 7, 8 & 9). The mounting procedure should be approved by **ILB HELIOS**; otherwise **ILB HELIOS** cannot give any guaranty for the module.

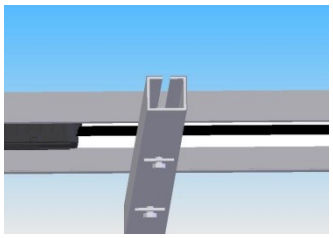

Fig. 7

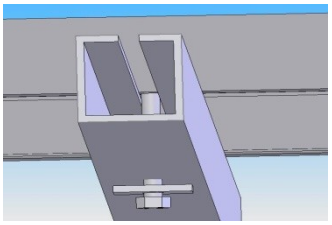

Fig. 8

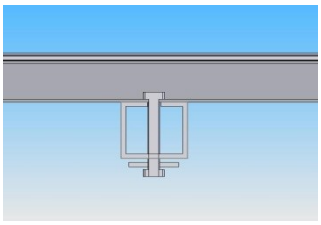

Fig. 9

⚠ Bear in mind the thermal expansion of the modules while you are installing them and keep enough space (5mm) between each module.

ILB Helios AG Switzerland / ILB Helios Spain S.A. / ILB Helios Italia S.r.l. | NA-Series | Version 22-038-2011

© Copyright 2009 ILB Helios AG | Specifications are subject to change without prior note. ILB Helios is not responsible for spelling mistakes or missing parts.

⚠ CAUTION

- Non-integral Modules/Panels must be install over a fire resistance roof covering rated for the application class of the Module/Panel.
- Modules should not be shaded by external objects at any time.
- Avoid mounting the modules with the junction box at the lower edge.
- Do not drill holes in to the frame of the module as this may cause severe damage. Do not cut or bend the module, nor do any kind of modification on the frame.
- Assure that the mounting systems are capable of safely supporting **ILB HELIOS** PV modules and ensure that the modules are not subjected to excessive forces due to thermal expansions of the support frame or structure.
- Do not install PV module where wind or snow loads exceed its specified limit. Please, consult the module data sheet for detailed information.
- Do not install PV module where inflammable materials are used. Do not install PV module at locations where they may be exposed to corrosive matters (as chemical factory, etc.)
- Clearance distance between the module frame and the support frame or structure is required to allow ambient air circulation around the back of the module. Minimum distance should be of 5 cm.
- Assure the fulfilment of prevailing safety regulations when installing modules and use prescribed safety equipment. Do not carry out installations with strong winds, rain, snow, humidity or any other type of adverse meteorological condition.
- Do not unpack the module until it is ready for installation.
- Do not step or stand on module frame or glass surface (back surface neither) during installation or handling, do not allow any object to fall and do not place any weight over the module.
- Do not drop the module on the floor and do not lay it upon uneven surfaces.
- The materials in contact with the aluminium frame should be corrosion resistant as stainless steel, galvanized steel, and aluminium or plastic.
- Check each module for damages before installation. Don't install damaged modules.
- Modules are not allowed to stay in tail water.
- Do not lift the module on the junction box or on the cable of the junction box.

ILB Helios AG Switzerland / ILB Helios Spain S.A. / ILB Helios Italia S.r.l.| NA-Series | Version 22-038-2011

© Copyright 2009 ILB Helios AG | Specifications are subject to change without prior note. ILB Helios is not responsible for spelling mistakes or missing parts.

5. MAINTENANCE

The objective of this paragraph is to clarify the minimum general operations that should be followed for a suitable maintenance of **ILB HELIOS** PV modules and installations.

ILB HELIOS will perform periodical preventive maintenance of the PV modules or installation upon customer's request.

ILB HELIOS PV modules are designed to require very little maintenance. The most important inspections to perform are the following:

- Clean the glass surface regularly with a clean and soft cloth using mild detergent and water; power output may decline with the dirt. Do not use chemicals and do not uninstall the PV module from the array.

- Periodically inspect for tightness all the electrical and mechanical connections of the PV modules, including grounding connections of the PV modules and mounting racks. This inspection should be carried at least twice a year. Loose connections will cause damage to the module or array.

6. Electrical Ratings of the Modules

You will find the actual electrical ratings for modules of the NA-series in the data sheets, provided on the **ILB HELIOS** home page (http://www.ilb-helios-group.com/downloads.datenblaetter.e.php) or in your purchasing contract.

7. Contacts

ILB Helios AG , Switzerland
Chamerstrasse 175
CH-6300 Zug
Fax : +41 (0) 41 7400842
E-Mail : solar@ilb-helios.com
Internet : www.ilb-helios-group.com

ILB International Logistikbetriebe AG , Switzerland
Bruggerstrasse 71
CH-6401 Baden
Fax : +41 (0) 56 205 30 60
E-Mail : info@ilb-helios.com
Internet : www.ilb-log.ch

ILB Helios Spain S.A.
C/. Alvarez de Baena 4
ES-28006 Madrid
Phone : +34 91590330
Fax : +34 914114547
E-Mail : spain@ilb-helios.com
Internet : www.ilb-helios-group.com

ILB Helios Italia S.r.l.
Via Leonardo da Vinci 97
I-20090 Trezzano s/Naviglio (MI)
Phone : +39 02 48464167
Fax : +39 02 48420120
E-Mail : italy@ilbhelios.com
Internet : www.ilb-helios-group.com

ILB Helios AG Switzerland / ILB Helios Spain S.A. / ILB Helios Italia S.r.l. | NA-Series | Version 22-038-2011

© Copyright 2009 ILB Helios AG | Specifications are subject to change without prior note. ILB Helios is not responsible for spelling mistakes or missing parts.